

provide a multi-phase alternating-current rotational electric machine which eliminates temperature variance among multiple devices, completely insulates high voltage devices from the ground and also has an appropriate
5 configuration suitable for semiconductor switching devices, such as MOSFETs, IGBTs, etc.

Furthermore, it goes without saying that the present invention can apply to a rotational electric machine which incorporates existing Si diodes or SiC switching devices,
10 and it can achieve excellent device cooling capability with no variance and is suitable for high voltage devices, which is a similar effect to the present invention.

WHAT IS CLAIMED IS

- 15 1. A multi-phase alternating-current rotational electric machine comprising:
- a housing,
 - a rotor shaft rotatably installed in the housing,
 - a magnetized rotor fixed to the rotor shaft,
 - 20 a stator which is arranged such that the windings of the stator coil are wound around the stator core fixed to the housing,
 - multiple semiconductor switching devices, installed in the housing, which adjust currents of the stator, and
 - 25 a heat sink fixed to the semiconductor switching devices

so that heat can be conducted, wherein

the semiconductor switching device is electrically insulated from the heat sink, and the heat sink is grounded to the housing as well as thermally separated in each phase.

5 2. A multi-phase alternating-current rotational electric machine comprising:

a housing,

a rotor shaft rotatably installed in the housing,

a magnetized rotor fixed to the rotor shaft,

10 a stator which is arranged such that the windings of the stator coil are wound around the stator core fixed to the housing,

multiple semiconductor switching devices, installed in the housing, which adjust currents of the stator, and

15 a heat sink fixed to the semiconductor switching devices so that heat can be conducted, wherein

the semiconductor switching device is electrically insulated from the heat sink, the heat sink is grounded to the housing, and the temperature of the multiple
20 semiconductor switching devices is substantially determined in each phase.

3. A multi-phase alternating-current rotational electric machine according to Claim 1, wherein

multiple fins are arranged on the base surface of said
25 heat sink and the substantially full flow of the air entering

into said housing passes through the multiple fins.

4. A multi-phase alternating-current rotational electric machine according to Claim 1, wherein

multiple fins are arranged on the base surface of said
5 heat sink and a cover, which has an opening almost identical to the projection of the heat sink in the direction of said rotor shaft, is provided.

5. A multi-phase alternating-current rotational electric machine according to Claim 1, wherein

10 the base surface of said heat sink is placed in parallel with the direction of the diameter of said rotor shaft.

6. A multi-phase alternating-current rotational electric machine according to Claim 5, wherein

said multiple fins of said heat sink are concentrically
15 arranged with said rotor shaft as the center.

7. A multi-phase alternating-current rotational electric machine according to Claim 1, wherein

said multiple fins located on the base surface of said heat sink are columnar and the multiple columnar fins are
20 arranged on the base surface in a lattice-like configuration.

8. A multi-phase alternating-current rotational electric machine according to Claim 1, wherein

said multiple fins located on the base surface of said
25 heat sink are columnar and the multiple columnar fins are

arranged on the base surface in a staggered configuration.